

WHAT IS CLAIMED IS:

1. A method of bonding a metallic membrane with metallic part comprising:
 - 5 mechanically pressing a smooth surface of the metallic membrane against a smooth surface of the metallic part;
 - heating the metallic membrane and metallic part to a temperature above the half melting point of the metallic membrane while subjecting the metallic membrane and metallic part to a controlled environment of a gas atmosphere.
- 10 2. The method of claim 1 wherein the mechanically pressing is in the range of 100 psig to 10,000 psig.
- 15 3. The method of claim 1 wherein the pressure exerted by the mechanically pressing together of the metallic membrane and the metallic part is in the range of about 1,000 psig to about 3,000 psig.
4. The method of claim 1 wherein the heating to a temperature above the half melting point is to a temperature between 450°C and
20 1100°C.
5. The method of claim 1 wherein the metallic membrane comprises palladium.
- 25 6. The method of claim 1 wherein the metallic membrane is a palladium-based foil.
7. The method of claim 1 wherein the metallic membrane is 75%/wt Pd-25%/wt Ag alloy.

8. The method of claim 1 wherein the metallic membrane is Pd-Ru alloy.
9. The method of claim 1 wherein the mechanical pressing, the heating and the subjecting to a proper gas atmosphere are carried out for at least 4 hours.
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10. The method of claim 1 wherein the mechanical pressing, the heating and the subjecting to a proper gas atmosphere are carried out for at least 5 hours.
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11. The method of claim 1 wherein the mechanical pressing, the heating and the subjecting to a proper gas atmosphere are carried out for about 24 hours.
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12. The method of claim 1 wherein the mechanical pressing, the heating and the subjecting to a proper gas atmosphere are carried out for about 30 hours.
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13. The method of claim 1 wherein the proper gas atmosphere comprises one of hydrogen, inert gas or a mixture thereof.
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14. The method of claim 1 wherein the pressurized gas comprises hydrogen.
15. The method of claim 1 wherein the pressurized gas comprises an inert gas or its mixture.
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16. A method of bonding a first metal object to a second metal object comprising:

mechanically pressing a surface of the first metal object against a surface of the second metal object; and

heating the first and second metal objects above the half melting point of one of the first and second metal objects, while being subjected
5 to a proper gas atmosphere.

17. The method of claim 16 further comprising:

polishing the surface of the first metal object; and

polishing the surface of the second metal object prior to the
10 mechanical pressing.